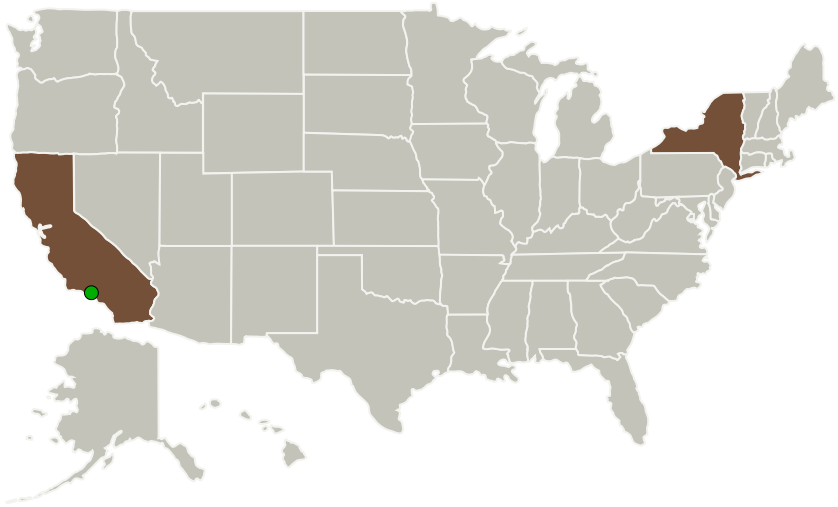
Development of a Hermetically Sealed Canister for Sample Return Missions, Phase I

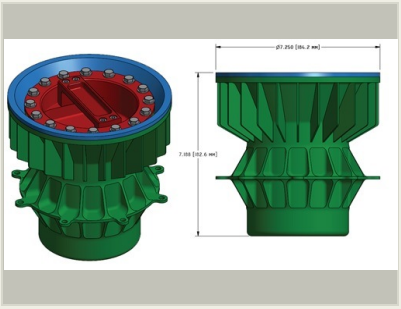
Completed Technology Project (2015 - 2015)

Project Introduction

The goal of the Phase I is to perform breadboarding and testing of the promising sealing techniques as well as perform a system level study to determine implementation challenges within actual mission architectures. The tests will be conducted on clean and 'dirty' seals. The results of the Phase I will be one or more options for hermetic sealing. During some approaches (Shape memory Alloy and brazing) additional data will be acquired to determine the temperature rise of the inner sample chamber. In the follow on Phase II of the proposed investigation, we will design and fabricate multiple high fidelity prototypes of the hermetic sealing canister and sealing system. The size and shape of the canisters will be designed to fit the requirements of any proposed or current sample return missions, such as Mars 2020. These canisters will include thermal insulation to protect and preserve volatile material within the samples, and will be optimized for mass reduction. We will test the hermeticity of the canister seal when exposed to dust accumulation, as well as thermal cycling, shock and vibration environments. This testing will result in a technology readiness level for the sample canister and sealing of TRL6 at the end of the Phase II investigation. We will also develop preliminary spacecraft requirements (mass, power, volume, etc.) for the sealing system.

Primary U.S. Work Locations and Key Partners





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Completed Technology Project (2015 - 2015)

Organizations Performing Work	Role	Type	Location
Honeybee Robotics, Ltd.	Lead Organization	Industry	Pasadena, California
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	New York

Project Transitions

June 2015: Project Start

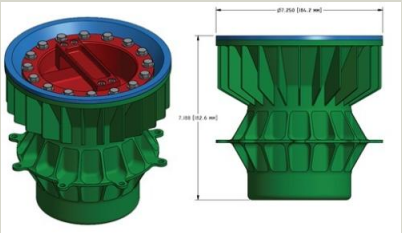
December 2015: Closed out

Closeout Summary: Development of a Hermetically Sealed Canister for Sampl e Return Missions, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/138797)*

Images



Briefing Chart Image
Development of a Hermetically Sealed Canister for Sample Return Missions, Phase I
(https://techport.nasa.gov/image/133925)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Honeybee Robotics, Ltd.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Philip C Chu

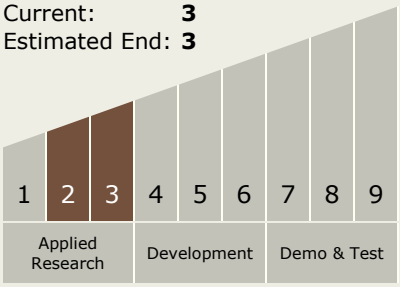
Co-Investigator:
Philip G Chu

Development of a Hermetically Sealed Canister for Sample Return Missions, Phase I

Completed Technology Project (2015 - 2015)

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.4 Environment Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System